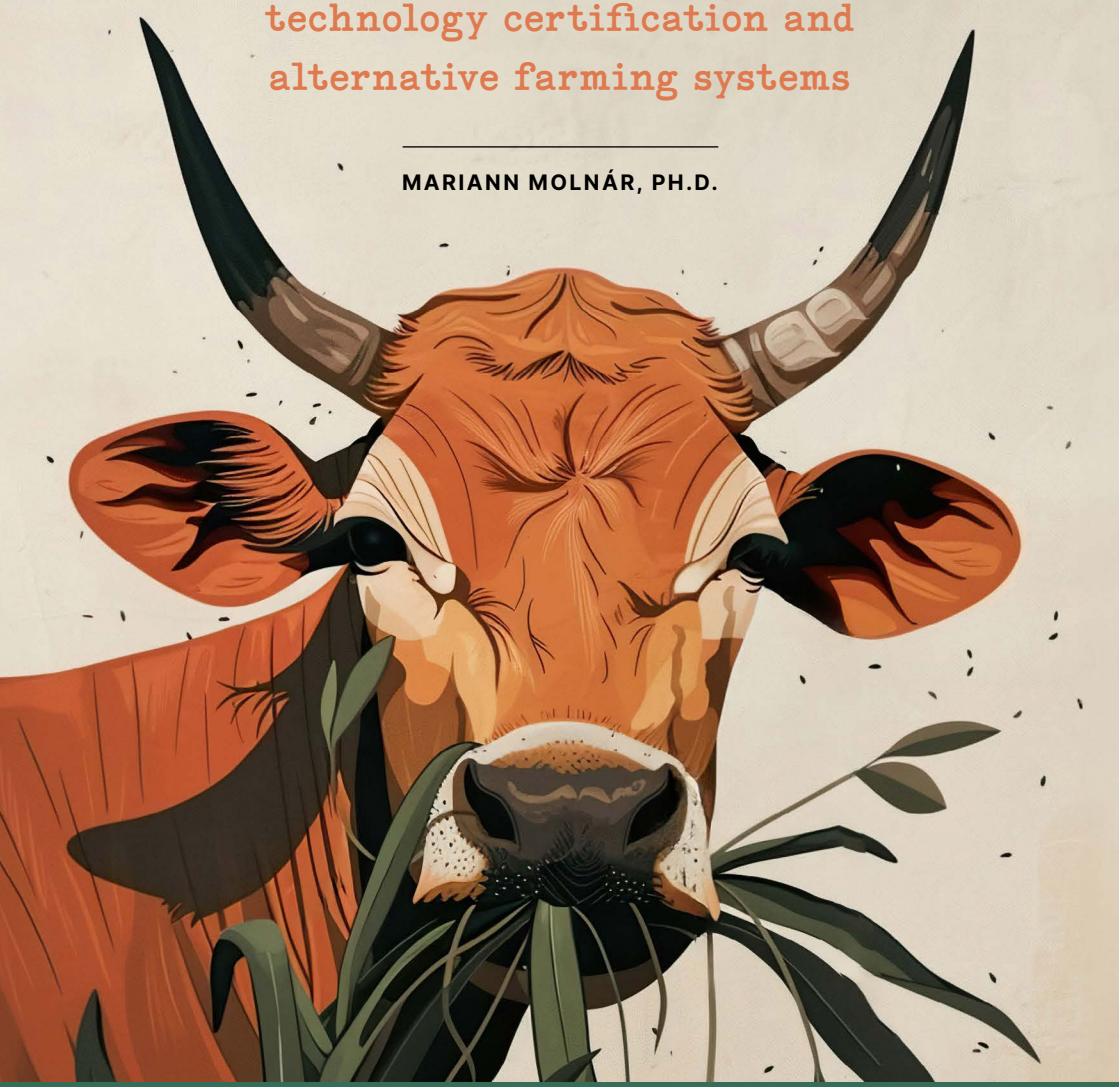
Enhancing farm animal welfare

through animal housing technology certification and alternative farming systems

MARIANN MOLNÁR, PH.D.



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Enhancing farm animal welfare through animal housing technology certification and alternative farming systems

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Budapest, July 2024

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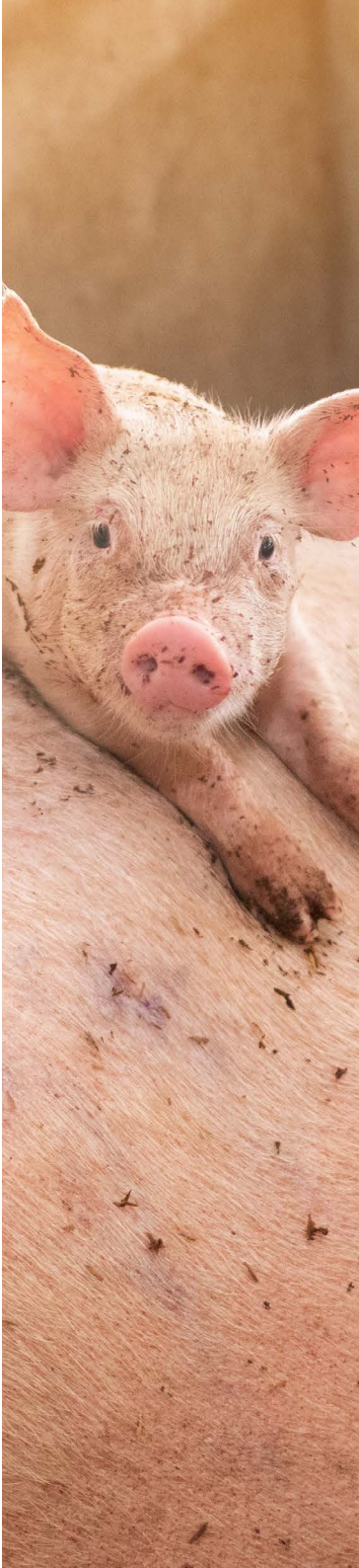


TABLE OF CONTENTS

Introduction 6

Current State of Intensive Farming 8
Large-Scale Intensive Production Methods Cause Serious Problems 10

Housing Tools and Equipment for Animal Farming 12

Influence of Housing Tools and Equipment 14
Focus on Production over Animal Welfare 18
Challenges Faced by Farmers 19
Marketing Doesn't Tell the Whole Story 21
Animal Welfare: Regulations and Production Standards 24

Solution 1: Farm Housing and Technology Certification 26

What is Farm Housing and Technology Certification? 28
The Swiss Farm Technology Certification System 29
How the System Works 30
Balancing Production Goals and Animal Welfare 35
Farm Technology Certification: Benefits and Challenges 36
Swiss Incentives Supporting Farm Animal Welfare and Technology Improvements 39
Implementing the System in European Transition Economies 42

Solution 2: Alternative ProductionSystems 44

What are Alternative Production Systems? 46
Benefits and Potential of Alternative Production Methods 48
The Logic Behind Alternative Farming Systems 49
Rethinking Agricultural Economies and Investments 52
Benefits and Challenges of Alternative Farming Systems 54
Incentives Supporting Alternative Farming Systems 58
Transforming Agriculture in European Transition Economies 60

Recommendations 62

Practical Actions toward Farm Technology Certification 64
Practical Actions toward Alternative Production Systems 66

References 70

REPORT SUMMARY

This Guidance Memo discusses housing tools and technologies used in intensive farming and their impacts on farm animal welfare.

Globally, most animals are raised in large-scale intensive systems. Out of 56 billion annually, 31 billion are in concentrated operations. This issue needs to be highlighted because many players in the value chain, not just farmers, directly influence the conditions animals are subjected to on farms. The impacts of farm technologies are relevant in all regions of the world, but especially in European transition economies, whether EU Members, candidate countries or non-members, are increasingly facing pressures to intensify agricultural production.

To address these issues, the report proposes two solutions. First, it recommends adopting the Swiss farm technology certification system that provides a flexible, data-driven approach to assess technologies before they are sold to farmers. This system, carried out by authorities in collaboration with technology suppliers and farmers, enables tool and technology innovation, ensures transparency, and improves housing conditions for farm animals. Second, the report argues for transitioning to alternative farming practices that have short value chains, do not need large investments in fixed technologies, and allow farmers to access growing niche markets. Alternative farming systems offer great potential for developing sustainable agriculture and improving farm animal welfare standards beyond the established industrial model.

Solutions are available to improve farm animal welfare, even in free-market conditions, though careful planning and communication between stakeholders is necessary to ensure their success. Change in agriculture is inevitable, and farmers need support to stay resilient and act responsibly.

Introduction

This Guidance Memo focuses on specialized farm tools and technologies used in intensive farming and the impact these technologies have on farm animal welfare. Understanding the role and influence of farming technologies is essential for developing more humane and sustainable farming practices. This report aims to shed light on the broader implications for animal welfare and describe two solutions for moving forward.

This topic needs to be highlighted because multiple players in the value chain directly influence the conditions animals are subjected to on farms. **Contrary to the common belief that farmers are solely responsible for the treatment of the animals, this report argues that farmers are only partially accountable for on-farm standards.** This mistaken belief is a concern even to the farmers themselves. Farmers – especially producers who have invested in intensive methods – often find that they are very limited in their ability to improve animal welfare standards[20].

Intensification of animal farming is a topic that is relevant in all regions of the world where agriculture is undergoing a process of consolidation, and an increase in the scale and intensity of farming. It is especially relevant in the European context because of the European Union's profound influence on policies aiming to improve on-farm welfare, and incentives hoping to transition farming away from the use of highly intensive practices.

But at the same time, **transition economies[28], whether EU Members, candidate countries or non-members, are increasingly facing pressures to intensify agricultural production**, with countries of Central Eastern Europe already transitioning to intensive systems. Others in the Balkan region, for example, have managed to retain most of their small-scale farming, yet many are contemplating the need to invest in large-scale animal farming operations.

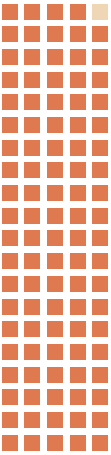
Current State of Intensive Farming

Most farm animals globally are raised in large-scale intensive systems. Annually, around 80 billion farm animals are produced worldwide[34]. Most animals, approximately 99% in the US[27] and 85% in the UK[4], are kept indoors in simple, functional environments with minimal human contact and with widespread use of automated technologies[20]. Globally, data are limited, but an estimate suggests 31 billion farm animals are housed in highly specialized, concentrated farming operations[1].

Trends indicate an ongoing transition toward more intensive animal production, as shown by increasing livestock density compared to agricultural land use, as well as the adoption of intensive technologies in many regions[24].

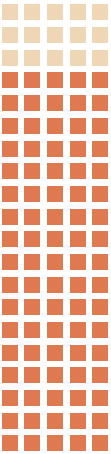
Intensive farms are often depicted as providing optimal welfare for animals, essential for high productivity. This portrayal reinforces the notion that intensive farming is the only economical way to produce safe and abundant food for growing populations[3,29]. Not only is the use of intensive farming methods communicated as the single viable farming method, the further expansion of intensive systems by about 68% by 2050 is widely encouraged[15].

Percentage of farm animals kept indoors in simple functional environments



99%

USA



85%

UK

Large-Scale Intensive Production Methods Cause Serious Problems

While intensive farming systems have been successful in producing large quantities of food, a growing body of evidence suggests that the problems with current production methods and food systems outweigh the benefits they offer[7,13,26,31,32]. One of the major challenges is that a significant amount of food, about a third of all food produced, ends up being wasted or lost at various stages from production to consumption[8,9]. This indicates a substantial problem and raises questions about the need to further expand intensive farming operations. Moreover, the negative impacts of intensive farming on global biodiversity pose a threat to the future of agriculture[35]. Ethical concerns, including numerous farm animal welfare issues, underscore the need for system-based solutions to these challenges[11].

Given the pervasiveness and the problems with intensive animal farming, the aim of the report is to:

Understand the industry that supplies intensive animal farming tools and technologies;

Present practical solutions to address these challenges, in particular, the Swiss technology certification system and alternative farming systems; and,

Provide guidance to governments, technical authorities, researchers, and development organizations to make data-driven decisions on policies and investments to reform agriculture in transition economies.

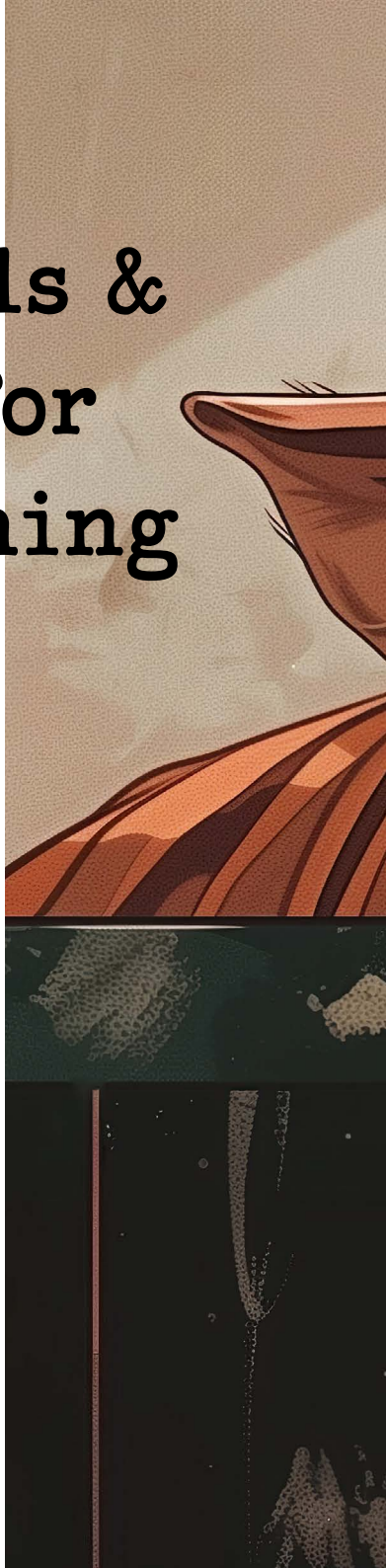
The data for this report were collected from various sources:

- **Intensive Housing Technologies:** Information was gathered from leading European farm technology manufacturers and suppliers through online and printed brochures, websites, agricultural fairs, interviews, and peer-reviewed publications.

- **Farm Technology Certification:** An in-depth case study of the Swiss system was conducted, along with additional information from Austria, where the system is fully implemented. Data sources included interviews with authorities and farmers, farm visits, websites, and peer-reviewed publications.

- **Alternative Farming Systems:** A detailed case study from Hungary was conducted, supplemented with data from agricultural enterprises in the US, Germany, and the UK. This included interviews with farmers, farm visits, websites, books, conference presentations, and peer-reviewed publications.

Housing Tools & Equipment for Animal Farming



Animal farming is increasingly adopting intensive technologies, such as precision farming methods, automated feeding systems, and advanced breeding techniques[13]**.** Despite progress in science, advocacy, and legislation to promote better animal welfare, intensive animal husbandry remains the dominant model since its emergence in the 1960s[17].

Influence of Housing Tools and Equipment

Industries supplying feed, farm animals, and housing tools significantly impact farming practices, but their influence on the food system is under-studied[19]. Farmers face intense economic pressure due a system in which large meat-processing companies have the power to dictate prices. **The current regulatory system is inadequate to protect farmers from economic pressures, as it does not cover important animal welfare issues, such as the quality of housing space, social interaction, and natural behaviour.** While these industries aim to address problematic animal welfare standards or practices, further research is needed to achieve these goals effectively[20].

Animal housing also has a big impact on farmers' attitudes and on farm welfare conditions. The more removed farmers are from direct interaction and care for their animals, the less they may be able to comprehend the animals' experiences. This can lead to the normalization of production practices that compromise animal welfare[19,20].

A wide range of intensive farming tools and technologies is available. In the European Union, most pigs, dairy cattle, laying hens, and broiler chickens are housed indoors in highly controlled environments[6]. These systems are designed to manage large numbers of animals in a relatively confined space with minimal labour, emphasizing simplicity, functionality, and efficiency.

Table 1 offers an overview of the types of farm housing tools and equipment used in modern animal production.

The key features of modern animal housing can be described as:

Simple and functional:

The design of these environments prioritizes ease of management and control, often at the expense of more complex or enriched living conditions for the animals.

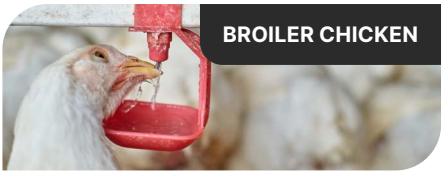
Focus on speed and efficiency:

The tools are engineered to ensure speed and efficiency in daily operations, reducing labour requirements and increasing productivity.

Advanced and sophisticated:

Advanced technologies assist in monitoring and decision-making processes, alerting farmers to emergencies and optimizing farm management.

Table 1 | **Tools and equipment in intensive farming**

	Housing and environment Aim to address the physical needs of animals
	• Pens, partitions • Gates, alleys • Railing • Slatted flooring • Climate control, ventilation • Piglet heat lamps, heated mats
	• Stalls, partitions • Gates, alleys • Railing • Manure management systems, scrapers • Climate control, ventilation • Rubber mats, water beds
	• (Enriched) battery cages • Regulated lighting • Manure or litter management systems • Climate control, ventilation • Perches, nests
	• Regulated lighting • Litter management systems • Climate control, brooding equipment, ventilation

Handling and management Aim to simplify farm management and reduce labour costs	Animal welfare related equipment Aim to address the behavioural needs of animals
• Farrowing crates • Treatment boxes, restraining systems • Castration and tail docking equipment • Hoof trimmers, ear notchers • Complex sensors • Precision monitoring systems • Ear tags	• Enrichment tools
• Milking parlours • Milking machines, robots, rotaries • Halters, neckbands • Treatment boxes, restraining systems • Hoof trimmers • Silage cutters, feed mixers • Feed wagons, pushers, refreshers • Complex sensors • Precision monitoring systems • Electronic identification ear tags	• Stationary, swinging brushes
• Hot blade or infrared beak trimming devices • Egg collection systems • Complex sensors • Precision monitoring systems	• Dust bathing areas • Nest box curtains
• Catching nets • Crates, transportation cages • Complex sensors • Precision monitoring systems	• Elevated resting areas • Panels, barriers

Focus on Production over Animal Welfare

Most housing technologies prioritize production needs over animal welfare. These technologies define the living environments of animals and the quality and quantity of human-animal interaction. **While they address basic physical needs like climate control and air quality, they often overlook other critical aspects of animal welfare, such as natural adaptations and animal agency[12,20], the ability of an animal to act on its needs, make choices, and manipulate its environment.**

What roles do housing technologies play?

Meeting Physical Needs: Technologies largely focus on ensuring animals have adequate climate control, air quality, and lighting. However, these measures often cater to production efficiency rather than holistic welfare.

Invasive Procedure Management: Many tools address only immediate management issues, such as safe handling during invasive procedures, rather than promoting overall animal well-being.

Neglected Welfare Needs: Important aspects like natural behaviours and social needs of animals are often not prioritized. For example, the lack of environmental enrichment can lead to stress and behavioural issues in confined animals.

Challenges Faced by Farmers

Farmers are often criticized for using intensive farming methods, even though they rely on and work closely with other parts of the food production system, all of which have an influence on the methods they use[19]. **Many small to medium-scale farmers prefer near-natural housing conditions but lack the opportunities to implement them due to economic pressures and technological constraints[20].** These farmers recognize the limitations of current technologies and aspire to improve animal housing and care but are hindered by market dynamics. Market demands and competitive pressures push farmers to maximize productivity and efficiency, often at the cost of animal welfare. This economic reality forces many farmers to rely on intensive farming methods that are less costly and more productive in the short term[19].

Farmers also find themselves in a technological lock-in, referring to the entrenchment of particular technologies within the system, making it difficult to switch to alternatives or make major adjustments. Many continue to use intensive technologies that are not welfare-friendly because transitioning to alternative systems may require significant changes and investments.

The Value System Underlying Housing Tools and Technologies

The range of available **intensive housing tools reflects a broader value system pervasive in the farm animal industry**, impacting not just individual farms but the entire sector. The prevalent technologies and tools **embody a value system that prioritizes efficiency and productivity over animal welfare.** This system influences not only farming practices but also the broader industry dynamics. Furthermore, the influence of technology suppliers and their role in shaping farming practices have been less examined compared to the scrutiny faced by farmers. This imbalance highlights the need for a more holistic approach to addressing animal welfare issues in farming.

Addressing the limitations of current housing tools and technologies is essential for improving animal welfare in intensive farming systems. By recognizing the systemic influences and interdependencies within the value chain, stakeholders can work towards more sustainable and humane farming practices. Further research, policy interventions and technical advice are crucial to align technological advancements with comprehensive animal welfare standards.

Marketing Doesn't Tell the Whole Story

Marketing materials, including supplier websites and brochures, serve as essential marketing tools for technology suppliers in the agricultural sector, specifically within the realm of intensive housing technologies. Unlike product manuals, which provide farmers with detailed protocols on the installation, operation, and maintenance of these technologies, brochures are crafted to highlight their positive attributes and appeal to potential buyers.

Content and Focus of Brochures

Brochures typically provide a range of information designed to showcase the benefits of the technologies on offer, such as:

Physical Descriptions: Detailed descriptions of the physical properties of the technologies, including size, construction, and durability, are provided to give potential buyers a clear understanding of what they are purchasing.

Visual Design Layouts: General visual design and layout plans of farms are included, illustrating how the technologies function within a typical farm setting.

Product Lists: Comprehensive lists of available technologies, from individual components to interconnected systems, highlight how these tools can work together seamlessly.

Warranty and Servicing Information: Information on product warranties and servicing options is given to reassure buyers of the reliability and support available for their investments.

Client Testimonials: Testimonials from satisfied clients emphasize the positive impact of the technologies on daily operations, production indicators, and output quantities.

Attributes of Housing Technologies that are Promoted

Brochures predominantly emphasize the quality, user-friendliness, and reliability of the technologies, such as:

Optimized Space Use: Technologies are designed to maximize the efficient use of space and resources such as feed, energy, and labour.

Smart Farming Solutions: Brochures often feature data-driven, automated solutions, including precision farming tools that utilize IT and AI for real-time data analysis and early warning systems.

Environmental Controls: High-level environmental control and biosecurity measures are promoted, focusing on optimizing temperature, humidity, air quality, and hygiene standards.

Animal Welfare Features: Brochures claim to enhance animal welfare through features such as group housing, species-specific resting areas, and ergonomic designs that provide physical comfort.

Sustainability Contributions: Emphasis is placed on energy efficiency, by-product management, and overall sustainability contributions including improved energy-efficiency, the management of by-products and other outputs, aligning with growing public concern for environmental issues.

Economic Viability: Technologies are presented as economically viable solutions that ensure high food safety standards, consistent product quality, and cost efficiency.

Manufacturers frequently highlight the welfare benefits of their products, claiming that they improve stock health through controlled housing environments, provide species-specific optimal housing conditions, ensure ideal feeding through balanced diets, reduce stress by minimizing exposure to adverse conditions and aggression, offer comfort and behavioural stimulation with species-specific features, and enhance management practices with smart technologies aiding decision-making.

However, these **welfare claims are often presented in an overly positive light, lacking reflection on the challenges and limitations of large-scale, specialized indoor systems. When compared to other more objective sources that discuss these challenges**[11,13]**, the reliability of the brochures' claims – in their present form – becomes questionable.** The brochures promote a narrative that supports agricultural industrialization, which can significantly influence the perceptions and decisions of farmers. While marketing brochures are effective tools that highlight the benefits of intensive housing technologies, their overly positive portrayal may misguide farmers into thinking that high animal welfare standards will be easily achieved.

Animal Welfare: Regulations and Production Standards

Legislative Framework

The common regulatory approach in animal agriculture begins with a legislative framework that sets minimum standards for housing, handling, and care of animals. In the European Union, animals are recognized as sentient beings under the Treaty of Amsterdam (1997) and the Treaty of Lisbon (2007)[16]. Council Directive 98/58/EC defines standards for appropriate staffing, inspection, record-keeping, equipment, breeding procedures, and basic welfare standards for animals both outdoors and indoors.

Key EU Standards

The regulations ensure adequate definitions and acceptable standards in the following areas:

- ✓ Ensuring animals have sufficient space to move freely.
- ✓ Standards for the physical structures where animals are housed.
- ✓ Guidelines on food, water, and other necessary substances.
- ✓ Regulations on the physical alterations (mutilations) performed on animals.

Legislative Priorities

Current standards primarily focus on animal health and food safety, as highlighted in Council Directive 98/58/EC. However, **issues related to farm animal welfare, such as improving comfort standards, longevity, reducing stress and pain, preventing mutilations, and enhancing mental stimulation to prevent boredom and aggression, receive less attention.**

Impact of Housing Tools and Technologies

The emphasis on the physical aspects of welfare and stock management in legislative norms mirrors the focus observed in the product range of housing tools and technologies. These tools are often designed for large-scale, intensive agricultural enterprises, making them difficult to modify to meet higher welfare standards.

Role of Industry Players

Animal welfare policies mainly target the actions of farmers, often overlooking the impact of other significant players in the value chain. For example, housing technology suppliers sell expensive, inbuilt farming tools suitable only for large-scale operations that are challenging to adapt to better welfare standards. The processing industry sets the value of finished farm animals based on global market prices, rather than considering national or regional conditions, production costs, methods, and differences in production standards.

Need for Regulatory Reform

To effectively address welfare challenges, it is necessary to review and reform regulations to include all industries that impact on-farm conditions. Practices causing significant harm should be phased out, as demonstrated by the ban on battery cages. Animal welfare science and evidence-based advocacy have advanced policies to balance economic and welfare interests, but increasing intensification and indoor housing systems continue to pose challenges.

While progress has been made in improving animal welfare standards, ongoing regulatory reforms are essential to address the complexities of modern animal agriculture. Ensuring higher welfare standards requires the involvement of all industry players and a commitment to phasing out harmful practices.

SOLUTION ONE

Farm Housing and Technology Certification

“

Testing…has two major advantages. First, it focuses on housing systems that will affect the welfare of a large number of animals. Second, it is flexible and hence able to react within a short time to new developments in animal production.

Wechsler 2005, p. 72.

What is Farm Housing and Technology Certification?

In recent years, there has been growing concern about the welfare of animals in intensive farming systems. This has led to increased research into advanced and innovative production methods that can improve animal welfare while maintaining productivity[33]. One approach that has shown promise is **the use of technology certification systems that provide additional checks and balances to ensure that housing tools and equipment prioritize animal welfare.**

Farm housing and technology certification is a regulatory process that assesses and approves the tools, equipment, and housing systems used in animal farming before they are sold to farmers. The system includes a comprehensive evaluation of farming technologies by government authorities in collaboration with suppliers. The certification process aims to ensure that farm animals are housed in conditions that meet their physical and behavioral needs while also considering the practical and economic aspects of farming. By requiring certification, the system provides a mechanism for improving farm animal welfare, refining farming technologies, and increasing transparency in the agricultural sector. It serves as an additional regulatory approach that provides checks and balances within the free market of intensive farming technologies.

Technology certification can be a mutually beneficial arrangement for all stakeholders in the food chain, including technology suppliers, farmers, and consumers. For technology suppliers, certification provides accountability and transparency in the manufacturing, supplying, and daily application of farm technologies. This allows authorities to commit funds to research and collaboratively work to refine farming methods, ultimately leading to improved animal welfare standards in intensive farming systems.

The Swiss Farm Technology Certification System

The Swiss farm technology certification system is a pioneering approach to promoting animal welfare in farming operations that was originally initiated by Swiss citizens. In 1981, Article 5 of the Swiss Animal Welfare Act provided the legislative means for the official certification of intensive production systems, including furnishings and other pieces of equipment used in animal farming[33].

The certification system is designed to achieve several key objectives, such as:

- Limit the uptake of farm technologies that may potentially harm animal welfare
- Control and improve the standard of production technologies available on the market
- Encourage farmers to work with the best fitting technologies suitable to their specific circumstances
- Ensure the effective enforcement of national legislative standards

How the System Works

The Swiss system operates through a series of well-defined steps, each designed to thoroughly evaluate farm equipment and housing systems before they reach the market. This process involves five key components: application, initial assessment based on existing knowledge, practical testing for new or modified technologies, decision-making by the regulatory authority, and an appeals process. Throughout these stages, manufacturers, regulatory bodies, and scientific experts collaborate to ensure that farm technologies meet stringent animal welfare standards while remaining practical for farmers. The following section breaks down each of these components, providing a detailed look at how Switzerland's certification system functions in practice.

Legal Basis

The core of the certification system is outlined in Article 5 of the Swiss Animal Welfare Act:

"Mass-produced housing systems and equipment for the keeping of animals for the purposes of profit may not be advertised and sold without prior authorization from a service designated by the Federal Council."[33].

The certification process involves several steps:

1

Application

The manufacturer or importer applies to the Federal Food Safety and Veterinary Office (FSVO; *Bundesamt für Lebensmittel-sicherheit und Veterinärwesen*) for authorization.

The application must include:

- Detailed documentation of the technology
- Information on technical features, and
- Associated user manuals.

2

Assessment I: Initial Review and Existing Data Analysis

The initial assessment is based on:

- Published scientific literature
- Examination of the technology on 1-2 commercial farms, and
- Feedback from farmers obtained through telephone interviews.

3

Assessment II: Practical Testing

For new, modified, or technologies with animal welfare concerns lacking scientific evidence, this stage involves:

- Practical veterinary, physiological, and behavioural tests
- Evaluation of short and long-term welfare outcomes
- Tests conducted in research facilities or on commercial farms, and
- Comparative tests when possible (e.g., farrowing crate vs. farrowing pen).

4

Decision

Following the assessments, the FSVO makes a decision on the certification of the technology. The FSVO may grant either a temporary (conditional) or final authorization to applicants based on the findings of the evaluation process.

In reaching their decision, the FSVO has the option to consult an expert advisory board for additional insights and recommendations. However, the FSVO also retains the authority to make decisions independently within its jurisdiction.

This flexibility allows for a balanced approach that considers both expert opinion and regulatory discretion.

5

Appeal

If a manufacturer disagrees with the FSVO's decision, they have the right to appeal. In the event of an appeal, the entire official procedure is repeated to ensure a fair and thorough re-evaluation.

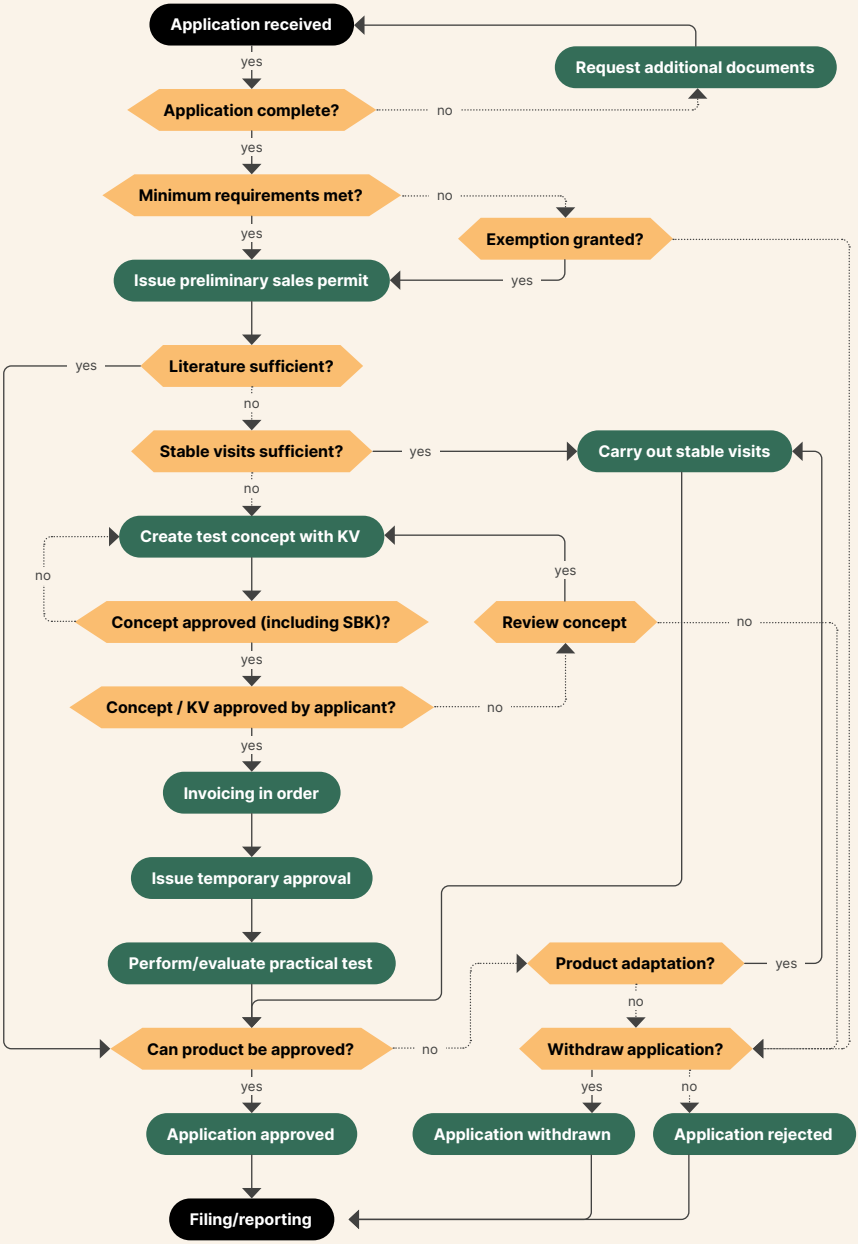
During the process, authorities may work with manufacturers to find a mutually acceptable solution that can lead to certification. This collaborative approach allows for refinement and improvement of technologies to meet the required standards.

However, if no agreement can be reached or if the technology fails to meet the necessary criteria after revisions, the application may ultimately be rejected.

6

Implementation and Transparency

- **Initial Testing:** Some technologies may be tested on a maximum of two working farms with temporary authorization
- **Widespread Use:** Once authorized, technologies can be used on an unlimited number of farms
- **Revisions:** Special cases may require revisions, with suppliers working with authorities to address challenges
- **Public Access:** A list of permitted tools and technologies is made publicly available at: www.bvet.admin.ch/stallliste



KV = estimate of costs | SKB = expert advisory board

Balancing Production Goals and Animal Welfare

The Swiss certification system is designed to find a compromise between production goals and the welfare needs of animals, as well as a mutually agreeable consensus between the technology suppliers and regulating authorities. It provides additional checks and balances within the free market of intensive housing technologies.

Technology certification was first developed in Switzerland and has been shown to improve animal housing conditions, the enforcement of legislative standards, and transparency in animal farming methods. **The system encourages farmers to invest in animal welfare-related technologies and encourages research into novel production methods for higher animal welfare standards.**

Mandatory certification has been adopted in Austria, while non-mandatory technology assessment is available in Germany. As concerns about animal welfare in intensive farming systems continue to grow, technology certification may become an increasingly important tool for ensuring the well-being of farm animals while maintaining productivity.

Farm Technology Certification: Benefits and Challenges

The Swiss certification system offers several key benefits that can improve animal welfare, transparency, and the development of better farming practices[33]. However, the system also presents some challenges that must be addressed to ensure its effectiveness.

Benefits

Transparency: Manufacturers are required to be fully transparent about the technologies they wish to develop, import, or sell to farmers. This transparency enables authorities to prevent the sale of problematic farming technologies before they are used, supports research funding on challenges associated with intensive technologies, and ensures increased transparency on production methods. This leads to improved policy implementation, higher public awareness, and greater consumer confidence.

Technology refinement: After concluding a certification procedure, the FSVO provides specific recommendations to companies supplying on-farm tools and technologies. This facilitates the refinement of products and product manuals before they are sold on the market, ensuring that the technologies meet animal welfare standards.

Informed decision-making: The assessment of product manuals by authorities allows farmers to make scientifically validated and informed choices on production technologies. This helps mitigate financial and animal welfare-related risks associated with investments in new technologies.

- **Legislation updates:** The certification procedure ensures that authorities can adjust or update farm animal welfare regulations based on the latest scientific and industry standards negotiated by the FSVO. This keeps regulations up-to-date and responsive to new developments in farming practices.

- **Improved housing conditions:** Technology certification provides an opportunity to improve on-farm animal housing and stock management standards to better reflect animal welfare needs. The FSVO works closely with relevant authorities and law enforcement agencies to coordinate animal welfare-related efforts and communicate with inspectorates to learn how authorized technologies perform in daily practice.

Importantly, the certification system does not limit or damage the business interests of manufacturers. Instead, it enhances the development of more reliable technological solutions for managing livestock in intensive housing systems. The procedure is based on a simplified administrative, yet comprehensive scientific evaluation method, and allows companies to refine their product range. Where needed, authorities can cooperate in the development of new alternative tools and technologies.

Challenges

Inconsistent datasets: Sometimes, datasets used during the testing are inconsistent because they come from different sources like animal behaviour, health, veterinary reports, and productivity indicators. To make balanced decisions, experts analyze each case individually and continuously collect, review, and discuss data until they can make the best decision possible.

Balancing interests: Finding the best possible compromise between the needs of farm animals and the interests of farmers can be difficult. If the data provide straightforward answers, decision-making is carried out by the FSVO at its own discretion. However, in more complex scenarios, an expert advisory board is consulted to negotiate the final decision. The advisory board represents different groups of interest, including consultants, manufacturers, animal welfare organizations, scientists, and farmers.

The Swiss certification system may be expensive to set up initially, but when considering the potential damages and harms caused by unregulated intensive operations, the costs to society may be relatively low. In Switzerland, the national government finances the system, and suppliers pay only "modest" fees when applying for certification. Suppliers have generally not protested the added layer of oversight. Farmers have incentives to support the system as well given that those who adhere to the legislative requirements are eligible for additional funding. Farms that do not comply are unable to request animal welfare-related payments.

In the experience of the Swiss system, these challenges are well-managed by the responsible authorities and tend to facilitate closer cooperation with farmers and technology suppliers.

Swiss Incentives Supporting Farm Animal Welfare and Technology Improvements

Switzerland has been experiencing a slow transition towards intensification and concentration of farming operations since the 1990s. In response, agro-ecology and agro-forestry measures have become high priorities on the political agenda. Additional incentives have been introduced to protect biodiversity, promote agro-ecological and regenerative farming practices, and decrease the use of chemical and industrial inputs such as herbicides, pesticides, and insecticides. These measures aim to change certain problematic aspects of production rather than transform the general approach to agriculture. While a slow transition to intensive methods is happening in Switzerland, there has been a consistent effort to prevent the concentration and use of large-scale, highly specialized indoor animal farming operations.

Many elements of the Swiss system help to ensure that legislative and financial mechanisms improve the lives of farm animals. This is based on a complex legal structure, a simplified administrative structure, and the proactive and practice-oriented collaboration of three different authorities:

The Federal Food Safety and Veterinary Office (*Bundesamt für Lebensmittelsicherheit und Veterinärwesen*), responsible for technology certification and minimum legislative requirements;

The Federal Office of Agriculture (*Bundesamt für Landwirtschaft*), in charge of additional standards and providing direct payments to ensure "optimal" standards; and,

The Cantonal Veterinary Offices (*Kantonale Veterinärämter*), which control the implementation of obligatory legislative standards and voluntary programs.

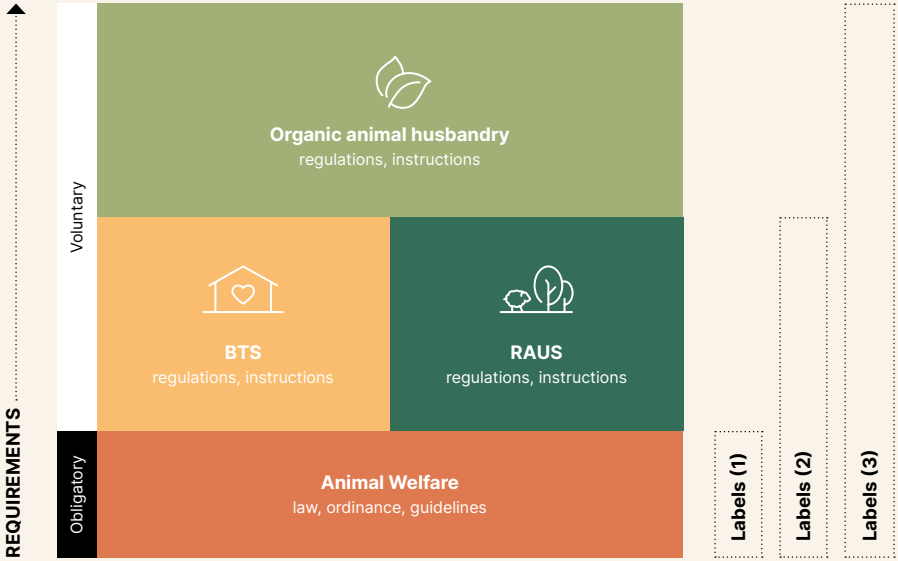
The different authorities operate in a way to promote welfare-friendly technology improvements in a number of ways:

Animal welfare law: While most animal welfare legislation aims to ensure standardization, the Swiss system employs a certain element of flexibility in its evaluation measures. This allows for assessing the individual circumstances of the farm, weighing challenges or benefits associated with these against each other, and employing an individually tailored method of farm certification within the authority's own jurisdiction. This nuanced approach is conditional and depends on the farmer observing high welfare standards at all times.

Direct payments: Targeted funding mechanisms are available to farmers to promote animal welfare, support biodiversity preservation, and deliver other important societal benefits. Direct payments are also key to safeguarding farm profitability, especially in disadvantaged areas, ensuring ongoing local production, and relieving farmers from competitive pressures on the market. Payments provide an incentive to observe legislative standards, as authorities withhold them if the farm does not comply with the law or if unauthorized technologies are used.

Voluntary programs: The FOA provides incentives for higher standards through three different programs. BTS (particularly animal-friendly housing systems; since 1993) ensures "animal-friendly" housing systems above minimum standards. RAUS (regular free-range exercise of livestock in the open) secures regular outdoor and pasture access (minimum 13 days/month in winter, 26 days/month in summer, 4 acres per livestock unit to ensure pasture feeding instead of concentrates). The "more pasture" program (launched in 2023) provides additional time outdoors for farm animals compared to the RAUS program (22 days in winter and 26 in summer) but is currently limited to bovines and is still under development and evaluation.

Animal Husbandry Requirements in Switzerland



Labels – private requirements:

1) **e.g. QM Schweizer Fleish** (QM = quality management), programme of the Swiss Farmers' Association
2) **e.g. Coop Naturplan, Migros 7-Point Programme**
3) **e.g. Knospe, Demeter**

Special product lines and labelling: In the 1990s, two supermarket chains developed their own private labels and brands of premium products produced to even higher standards (especially in terms of improved animal housing) than those required by mandatory and voluntary programs. The companies provide at least 80% of all sales, while the national Society for the Prevetion of Cruelty to Animals carries out inspections.

Implementing the System in European Transition Economies

In countries where the intensification and consolidation of animal farming is already taking place, with animals increasingly kept in large-scale, highly specialized indoor systems, the certification of farm technologies based on the Swiss model will:

- Shift intensive animal agriculture toward higher welfare standards;
- Provide opportunities for technology innovation to support welfare; and,
- Ensure the implementation of measures beyond minimum legislative standards and market-based mechanisms.

The Swiss model could be easily applied in transition economies beginning to intensify animal agriculture, like non-EU countries in the Western Balkans. These countries, typically have small-scale farms and need to increase food production to reduce imports. Authorities that are considering intensification but are not focused on improving existing systems with alternative farming methods should consider the Swiss model to ensure a good balance between production goals and welfare interests.

Countries already using intensive farming will also benefit from technology authorization, but it needs to be communicated early to ensure awareness and support of the certification system. Positive and professional communication with industry is crucial to enable cooperation. Adapting the Swiss system will require understanding its elements, so consulting experts from the Swiss Farm Animal Welfare Research Centre and the Austrian Animal Welfare Centre would be helpful. They can provide valuable insights and advice for transition economies.

Helpful Resources for Technology Certification:

- Swiss Federal Food Safety and Veterinary Office
  www.blv.admin.ch/blv/en/home.html
- Austrian Animal Welfare Centre
  www.tierschutzkonform.at/en/
- German Agricultural Society (DLG)
  www.dlg.org/en/

SOLUTION TWO

Alternative Production Systems

“

We have to switch to more sustainable ways of farming and producing food. Terminating our love affair with industrialized grain fed meat production will be crucial… The biggest change in food production…is regenerative agriculture, also known as ‘agroecological farming’… Farmers themselves…are challenging the industrial mindset.

Tree and Burrell 2023, p. 36.

What are Alternative Production Systems?

A second approach to addressing welfare concerns in animal farming is to transition to alternative production systems that are less intensive, and focused on improving soil health, biodiversity, and enhancing ecosystem resilience. In Europe, there seems to be growing momentum supporting a transition to alternative systems to address the shortcomings of large-scale, intensive, and highly specialized farming methods. However, as this is a new phenomenon, more work is needed in certain areas to ensure the adaptability of alternative methods in larger-scale systems. Many have also pointed out that, given the growing evidence on the many problems associated with intensive agriculture, large industrial players that underpin the system should justify why the status quo should remain[10,21,22,23].

Alternative production system is an umbrella term encompassing various types of non-conventional, semi-intensive, and extensive farming practices. These systems replace external inputs, automated machinery, and expensive technologies with comparatively more manual labour than intensive systems. They also rely on local and well-adapted breeds of plants and animals in diverse, integrated farming operations, and utilize ecological services, i.e., natural subjects and processes, to achieve production goals. They also process their own goods and sell them through short value chains[18,31,32].

Overview of alternative farming methods

Certified organic

Agro-ecological

Regenerative

Permaculture

Biodynamic

Holistic

Circular

Benefits and Potential of Alternative Production Methods

Contrary to mainstream beliefs that view alternative farming as inefficient, laborious, and expensive[30], alternative production methods have been found to provide numerous important contributions to agricultural production and a wide range of social, economic, and environmental benefits[18]. While adapting alternative production methods may pose a challenge to highly industrialized agriculture companies, in countries where small-scale extensive farming is still predominant or in regions with a range of farm scales and intensities, alternative farming offers great potential.

A switch to alternative farming would not automatically result in abandoning all farming technologies or innovations. Instead, it presents opportunities for companies to grow, expand, and explore solutions for a niche of animal farming where production and processing require a different set of tools, are based on a different scale, intensity, and logic, and where the production of quality food, on-farm processing and the sale of products on short value chains are clear priorities.

The Logic Behind Alternative Farming Systems

Alternative farming systems provide different answers to the same challenges that all agricultural producers face[19,20]. **While intensive systems prioritize profits by creating large quantities of fast-growing breeds in simple and functional spaces, alternative systems apply agro-ecological, regenerative production methods along with a diverse range of well-adapted traditional breeds that can be housed in more natural outdoor or semi-outdoor systems.** In these animal farming operations, livestock are integrated with other product lines, such as arable farming and cattle grazing systems, or fruit production with laying hens. The farming methods used are nature-based and semi-intensive to extensive, rather than highly specialized and intensive. This integrated, less-intensive approach allows the farmer to use the land and resources in a more diverse, versatile, and ecologically-balanced manner. Most investments focus on creating a system where producing, processing, and selling happen within the same business to keep more of the profits[18,31,32].

While many intensive farms require subsidies, development grants, and bank loans to continue farming[19], alternative farmers prefer to avoid these financial transactions (except for subsidies) and work to increase the resilience of their farms by building simple, cost-effective, and "appealing" production systems[18].

Alternative production also offers a promising solution for sustainable agriculture, providing numerous benefits and opportunities for farmers, the supplying industry, and the environment. As the momentum for alternative systems grows, it is crucial to further research and develop these practices to ensure their effectiveness, feasibility and adaptability in addressing the challenges posed by intensive agriculture.

Table 2 below compares characteristics of large-scale intensive farming vs alternative production systems.

Table 2 | **Characteristics of intensive vs alternative systems**

Large-scale intensive	
Very high	Intensity
Very fast	Production speed
Large amounts of uniform products	Farm output
Under assessment, but presumed to be low, especially in terms of nutrient content	Product quality
Highly specialized, automatized, fixed inbuilt housing technologies, low number of skilled workforces	Investments
Intensive, fully dependent on specialized machinery, increasingly automated	Use of machinery
Limited, fixed technologies with minor adjustments and improvements	Technology adjustments
External industrial inputs (e.g. housing, feeding, watering, breeding), sensors, medication	Inputs
Predominantly indoors	Housing of stock
Fast-growing, high producing (e.g. feed conversion, number of offspring, eggs, milk) industrial stock	Strains of animals
No or minimal reliance on animal agency	Animal agency
Systematically carried out	Invasive practices
No processing, finished animals are sold live	Processing
World market	Market
Rare, but some industry-based certification can be found (e.g. geographic area, freshness, controlled quality)	Brands, labels

Small- and medium-scale alternative

Semi-intensive, extensive

Slow to medium

Large range of diverse products

Where assessed, nutrient content was high
in comparison to intensive products

Diverse farming system that depends mostly on versatile
technologies, some automatization, and skilled workforces

Small to medium amount, semi-dependent on the use of a limited
range of specialized or multiple-purpose machinery

Possible, the system must remain flexible and able
to respond to changes in the system

Largely independent from external inputs, when used alternative (e.g. ecologically
certified) or local resources are preferred (e.g. feed, straw, pasture)

Range between semi-indoors to outdoors

Slow growing, well adapted (traditional, local) breeds, with
comparatively lower yields than industrial breeds

Relies on animal agency

Rarely carried out

Processing, finished animals and other derivatives are minimally processed
(e.g. meat, eggs, milk, cheese) or processed into final product (e.g. cooked or smoked)

Niche markets, short value chains, community-supported agriculture (CSA)

Most products have a brand (i.e. name of the farm or farmer) and may be
certified (e.g. ecological, biodynamic). Additional systems exist that would benefit
from labelling, such as regenerative, permaculture, agroecological, holistic,
and circular systems that integrate animal farming in their enterprise

Rethinking Agricultural Economies and Investments

While alternative production systems offer numerous benefits and opportunities for sustainable agriculture, they do not match the volumes or profits demanded by the current mainstream market system. This fact highlights the need to rethink revenue production, consumer prices, sourcing, product quality measurements, and the distribution of agricultural funds. The differences between alternative and intensive farming systems become apparent when all externalities are fully accounted for[13] and product quality is properly assessed[2,14,25].

Alternative farming operations produce more than just a range of final products, they respond to different challenges associated with farming and engage in activities that offer additional positive contributions to farmers, local communities, farm animals, and wildlife in and around farms[31,32]. They depend on biodiversity, functional ecosystems, and ecological services, which makes them clearly distinct from intensive farming approaches. Alternative farmers therefore invest in reconstructing and (re-)integrating natural habitats within their farming operations and keep their farm animals in more natural, semi-intensive, and extensive conditions[31,32].

Therefore, alternative production does not require the use of expensive external inputs, but more the use of a limited range of tools and technologies, only those that ease some aspects of physical labour[18]. However, in terms of processing needs, alternative farmers require a complete range of technologies tailored to the scale, quality requirements, and diverse product range of their operations[31,32]. Given the openness and responsiveness of technology suppliers to pursue innovation, the growth or expansion of alternative farming may offer an important prospect even for manufacturers to develop and sell a range of specialty products tailored to these emerging markets. As transition economies and the supplying industry recognize the potential of alternative production systems, there is a growing opportunity to develop and support these practices as a viable alternative to intensive farming.

Benefits and Challenges of Alternative Farming Systems

Benefits and Opportunities

Alternative farming systems offer a range of opportunities and benefits, particularly in the production of diverse, high-quality, and nutritious food sold through short value chains. This attribute provides farmers with a relatively stable market and more predictable income[18]. Unlike the mainstream market, alternative systems allow farmers to have a certain level of control over the price of their finished products, which can be better adjusted to production costs[19]. Food produced in alternative systems also provides:

Access to a growing niche market: Consumers increasingly seek transparency in farming methods, accountability, and personalized brands. Trust in alternatively produced food is established through consistency between the farmer's principles and practices. Many alternative farmers report that while initially met with scepticism, the quality of their products, the resilience of their farming operation, and their determination to use alternative methods positively impact others over time.

Versatility and resilience: The versatility of alternative production methods offers farmers the opportunity to realize income from many sources, supporting farm resilience. It also allows farmers to engage in diverse activities (production, processing, and trade) that are perceived as interesting, fulfilling, and rewarding. These positive feelings towards their farming enterprise are an important element of alternative systems, supporting healthier, happier farming communities and a higher likelihood of succession.

Environmental sustainability and high welfare standards: Alternative farmers advocate for environmental sustainability, a reduction in industrial inputs (e.g., medicines, chemicals, energy), and promote high welfare standards through innovative and adaptive farm designs. These aims are well-received by the public and ensure the multiple use of farmland, buildings, and tools, preserving natural resources and supporting the development of circularity.

Adaptation to local environments: Alternative farming operations are tailored to their local environments, which define the types of plants and animals produced and the product range sold. Adaptation to existing circumstances is at the core of these operations, allowing alternative systems to "ease" productivity. In this process, farmers often receive positive feedback and reinforcement through the system they build, the environments they revive, the plants and animals they attend, and the consumers to whom they sell their products.

Challenges of Transitioning to Alternative Farming Systems

One of the biggest challenges in the switch to alternative farming systems is changing the mindset of farmers[18]**.** Many farmers say alternative methods are often overlooked because conventional farming habits are so deeply rooted[20]. This attachment to industrial methods prevents farmers from considering the need to adapt to new environmental, social, and legal changes[5]. Other challenges include:

Limited knowledge: Intensive farming methods are more widely taught, and consultancy services are more abundant for these systems. Most conventional farmers are not trained in alternative production practices.

Decrease in yields: Without the processing of finished animals and the use of niche markets, yields in an alternative system will not be adequate for the mainstream market, where both the quantity and low price of the product are essential.

Need for diverse skills: Diversified income streams and the need to develop products may require a unique set of skills from a farmer or the support of experts willing to explore development strategies.

Compatibility with local environments: Alternative farms are designed to be fully compatible with the physical environment they are established in. This means that farmers will need to carefully plan and develop their farming operation to local circumstances, which may take more time and adjustment than in the case of an intensive indoor system, where environmental conditions are altered or regulated with technologies and other industrial inputs.

While the challenges and benefits of alternative production systems differ from those of intensive farming units, they support the development of sustainable, resilient, and transparent farming operations[31,32]. It is essential to allow farmers of different scale and intensity operations to openly share their insights and practical knowledge with one another to build trust in alternative methods[18]. As the demand for sustainably produced food grows and the limitations of intensive farming become more apparent, alternative farming systems present a promising opportunity for farmers, consumers, and the environment alike.

In countries where animal farming has not yet intensified and mainly involves small to medium-scale farms, developing alternative production systems can boost agriculture and produce a variety of high-quality foods, increase farm revenue by enabling on-farm processing and direct sales to consumers through niche markets, and apply farming methods that benefit communities, improve animal welfare, preserve natural resources, and conserve biodiversity. These benefits protect farmers' interests, enhance animal welfare, and create new business opportunities for technology suppliers.

Incentives Supporting Alternative Farming Systems

Implementing effective incentives for alternative farming depends on the goal, whether it is to maintain and improve current farms, start new alternative farms, or shift large farms away from intensive methods. It is important to consider the larger context of farming before implementing any incentives. Based on the perceptions of alternative farmers, the following list of measures can support the transition to alternative farming systems[18]:

Agricultural strategy: Developing a national strategy that considers global trends of intensification but is also mindful of adaptation needs, the benefits of quality products, and the importance of local processing and niche markets is essential. A favourable agricultural strategy that can differentiate between the needs of different systems will be able to offer a range of supportive instruments to agricultural producers who wish to apply alternative production methods.

Legislative standards: As in the case of agricultural strategies, agricultural policies that differentiate between the diverging standards and production goals of intensive and alternative farms are much needed. Alternative operations are dissimilar to intensive indoor farming practices, and therefore minimum standards defined in most countries do not provide enough guidance to farmers or implementing authorities.

Development grants: Access to development grants can help accelerate the establishment of new alternative farms and the expansion of transitioning operations. However, they will only be useful to alternative producers if tailored to their specific needs, such as financing investments into agroecological systems, product diversification, processing capacities, and marketing know-how, without requiring an increase in the scale, intensity, or specialization of the operation.

Certification and labelling: The ability to differentiate alternative products on the market is essential for producers to achieve price premiums. To encourage and support transparency, reliable certifying bodies and other labelling schemes that consider the production methods are needed. Many of these already exist, led by government or third-party certifying bodies (such as Fairtrade, EU Organic and other food labelling schemes).

Streamlined administrative system: While having consistent laws is important, it is crucial not to over-regulate alternative farming or overwhelm farmers with layers of administration. The administrative system for alternative farming should support inspectors and enforcement agencies, encourage compliance with laws, and consider the unique situations of each farmer.

Education and awareness-raising programs: Updating education programs is important to raise public awareness and provide better training for farmers on the strengths and weaknesses of different farming methods. Additionally, since many farmers learn from each other, sharing knowledge in informal networks is valuable and should be encouraged and supported.

Alternative farming operations require a supportive environment and a carefully designed range of financial, legislative, administrative, and social incentives to enable the establishment of new operations and transition existing farming operations to the use of alternative production methods. These incentives will support a balance of technology use with other important aspects of farming, including high animal welfare standards.

Transforming Agriculture in European Transition Economies

In countries where the intensification and consolidation of animal farming is only just beginning and animal farming has retained small- to medium-scale, extensive, semi-intensive systems, a transition to diverse alternative farming systems will:

- Enable the production of a wide range of high-quality food, limiting or eliminating the need for intensifying animal agriculture;
- Provide opportunities for the development of resilient, sustainable, and transparent farming operations,
- Ensure the development of legislative and financial incentives that support alternative farming operations.

Applying the proposed solutions to transitioning economies can bring many benefits, but these strategies need to be adjusted to fit local farming, processing, and trade conditions. Transition economies vary widely: some are high-income, some are low or middle-income, and they include EU Member States, EU candidates, and non-EU countries. What they all share is a post-communist past, meaning they were centrally planned economies until the 1990s and are now shifting to market-based economies.

This history has greatly affected animal agriculture. In Central and Eastern Europe, land and agricultural industries were consolidated, but state-owned companies lacked capital and did not become as efficient as privately-owned Western European farms. After privatization in the 1990s, farmers struggled to reclaim and restart their farms while competing in a global market. In the Balkans, small-scale farms persisted, but now there is a push to make farming more efficient and reduce reliance on imported animal products. **These countries face major changes in farming laws and economic conditions, and farmers must navigate economic difficulties, environmental issues, and conflicting laws and consumer demands.** Change in agriculture is inevitable, and farmers need all the support they can get to stay resilient and act responsibly.

Helpful resources for alternative farming methods:

- Tree, I. 2018. Wilding: The return of nature to a British farm. Picador, London: United Kingdom.
- Tree, I. and Burrell, C. 2023. The book of wilding: A practical guide to rewilding big and small. Bloomsbury Publishing, London: United Kingdom.
- Salatin, J. 2013. You can farm: The entrepreneur's guide to start and succeed in a farm enterprise. Chelsea Green Publishing, London: United Kingdom.

Recommendations

> A transformation of food systems...is not only biophysically and technically feasible; it offers immense economic benefits to societies across the world. The net benefits of achieving food system transformation are worth 5 to 10 trillion USD a year... And yet the unaccounted costs of (the current food systems) are currently estimated at 15 trillion USD a year.

Food System Economics Commission (FSEC) 2024, p. 3-4.

This report has explored the challenges and opportunities in animal farming, particularly in transition economies. It has identified key issues with current intensive farming practices and the potential benefits of adopting alternative farming systems and technology certification processes. The Swiss model and alternative farming practices have been highlighted as effective models.

The findings are significant as they address critical issues in animal farming, including animal welfare, sustainability, and economic viability. Implementing these solutions can lead to more resilient and ethical farming practices, ultimately benefiting farmers, animals, and the environment.

Practical Actions toward Farm Technology Certification

To effectively implement technology certification in farming, the following practical actions are recommended. These actions aim to create a comprehensive regulatory framework, establish responsible authorities, and ensure transparency and collaboration between various stakeholders.

Government

- Create a regulatory system that requires farm technologies to be certified as complying with minimum animal welfare standards before use, and only allows the application of certified farming tools.
- Set up an authority for technology certification and hire enough well-trained experts.
- Equip the authority with the necessary facilities and establish procedures for technology certification.
- Develop a streamlined administrative system for the authority, ensuring coordination with other regulatory bodies and regular expert meetings for ongoing communication.

Development organizations

- Carry out holistic assessment of development needs in transition economies that are reflective of pressures that drive intensification, accounting for the risks associated with a transition to intensive, highly specialized farming systems and technically "unsupervised" industrial investments.
- In countries or regions where there is a transition to the use of intensive farming systems, direct development funds to the establishment of a technology certification system. Once the certification system is operational, provide further funding to support agricultural investments in alternative, less intensive production methods.

Technical Authorities

- Establish connections between the authority, national and international technology suppliers.
- Ensure transparency in technology certification by publishing and constantly updating the list of certified technologies on a publicly available website.
- Improve on-farm housing and management by establishing voluntary programs, special product lines, and labelling schemes, encouraging farmer participation and rewarding them for additional animal welfare-related investments.

Researchers

- Research and develop new solutions to production challenges, especially those related to ensuring farm animal welfare.

Practical Actions toward Alternative Production Systems

To effectively promote alternative farming systems, several key actions are recommended for policymakers and authorities. These steps aim to enhance agricultural practices, increase farm revenue, and support the overall development of sustainable and humane farming methods. Below are a range of suggested actions to facilitate this transition.

Government

- Assess the national context of animal farming and identify emerging needs.
- Develop a comprehensive agricultural strategy and supporting legislative framework to encourage diverse alternative farming systems.
- Allocate funding for farm and product development, including investments in on-farm processing and marketing skills.
- Establish voluntary programs and labelling schemes to encourage farmer participation and reward animal welfare investments.
- Develop an advisory centre to support farmers in establishing new alternative farming enterprises or transitioning existing farms.

Development organizations

- Conduct a comprehensive evaluation of the specific needs and challenges faced by local agricultural systems, considering their unique characteristics and potential for development.
- Formulate a strategic plan that outlines practical measures to enhance the quality and quantity of agricultural products while ensuring the economic viability of small to medium-scale farms. This plan should focus on leveraging the strengths of these farming operations and addressing their limitations.
- Provide funds for initiatives such as:
  - Education and awareness programs that showcase successful examples of alternative farming systems, highlighting their benefits and providing guidance on transitioning to these methods.
  - Investments in regenerative and agro-ecological farming practices that prioritize sustainability, soil health, biodiversity conservation and high animal welfare standards.
  - Support for the establishment of on-farm or local processing facilities, enabling farmers to add value to their products and increase their income potential.
  - Support for effective marketing strategies and access to short value chains, such as direct sales to consumers, farmers' markets, and local restaurants, to ensure fair prices for farmers and foster closer connections with the community.

Technical Authorities

- Promote agricultural exhibitions, local food fairs, and open farm days to reconnect producers with consumers and raise awareness of alternative farming methods.

Researchers

- Conduct farmer training programs on alternative farming, with experienced farmers sharing their knowledge and supporting visits to exemplary farms.
- Ensure agricultural schools and universities offer updated training in various production methods, including the challenges and opportunities of intensive and alternative farming.
- Provide guidance on alternative farm design, investment needs, and business plans tailored to specific environments and circumstances.

Implementing these actions can encourage the adoption of technology certification and alternative farming methods, on-farm processing, and trade through short value chains. Both approaches are particularly suitable for transition economies with small to medium-scale farms under pressure to increase efficiency and invest in intensive farming.

Countries already using intensive indoor farming will benefit from technology certification and increased benefits from incentives supporting alternative farming, but it is crucial to ensure equal support for both systems. Understanding all aspects of both solutions is essential, so contacting and visiting certifying authorities and successful alternative farmers is highly recommended. These experts and farmers can offer valuable insights and advice for establishing technology certification or transitioning to alternative farming systems in transition economies.

With careful planning and positive communication among technology suppliers, producers, and authorities, solutions are available to significantly improve farm animal welfare, even in free-market conditions. Intensive production is a choice, not a necessity, as shown by exemplary farming operations. For farms using or transitioning to intensive methods, technology certification can provide essential checks and balances to ensure better animal welfare.

Change in agriculture is inevitable, and farmers need support to stay resilient and act responsibly, so the solutions discussed in this report should be seriously considered, whether individually or combined. To best adapt these solutions to local conditions and avoid duplicating efforts, international technical forums for authorities should be established to share knowledge on changing trends in technology and experiences with alternative farming systems worldwide.

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